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Topic:

Measurements of Direct Drive Laser Imprint in Thin Foils by XUV Radiography Using an X-Ray Laser Backlighter.*

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For direct drive ICF, a capsule is imploded by directly illuminating the surface with laser light. Beam smoothing and uniformity of illumination affect the seeding of instabilities at the ablation front. We have developed a novel technique for studying the imprint of a direct drive laser beam on a thin foil using an x-ray laser as an XUV backlighter. We use multilayer XUV optics to relay the x-ray laser onto the directly driven foil, and then to image the foil modulation onto a CCD camera. This technique allows us to measure small fractional variations in the foil thickness. We measured the modulation due to imprint and subsequent Rayleigh-Taylor growth due to a low intensity 0.35 μm drive beam incident on a 3 μm Si foil using an yttrium x-ray laser on Nova. We used a similar technique to measure the imprinted modulation and growth due to a low intensity 0.53 μm drive beam incident on a 2 μm Al foil using a germanium x-ray laser at the Vulcan facility. We present measurements of the modulation due to static RPP and SSD smoothed speckle patterns at both 0.35 μm and 0.53 μm irradiation. We also present measurements using ISI smoothing at 0.53 μm. We compare the results with the modulation due to a single mode optical imprint generated by a narrow slit interference pattern.

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